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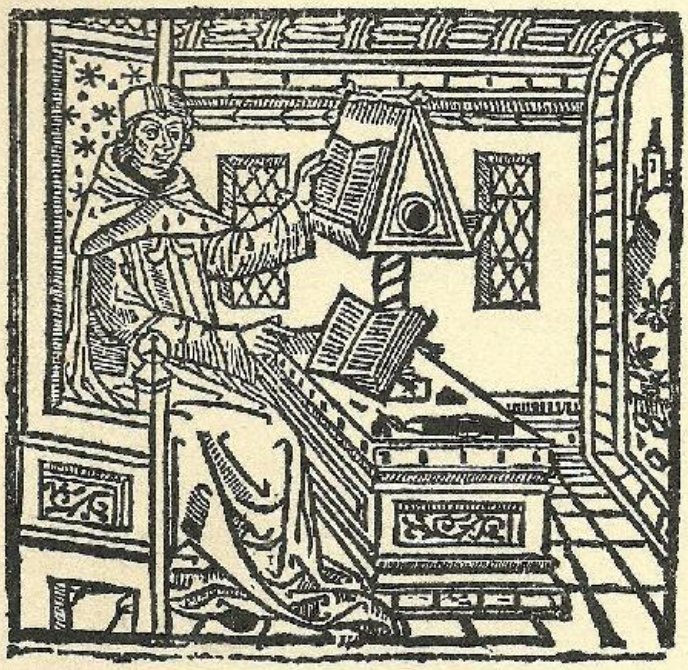

Black Letter: its Origin & Current Use, p. 1

43 FETTER LANE, LONDON, E.C.4 REGISTERED TRADE MARK MONOTYPE

THIS NUMBER OF THE MONOTYPE RECORDER

is set in "Monotype" Bembo, Series No. 270

On page iv of cover, a showing of Series No. 457, Black Letter

PRINTING EXECUTIVES will read with interest the lively and practical commentary by Mr. C. E. Batey on questions of organization that affect output and profits.

TYPOGRAPHERS, and the many others among our readers who have been calling for further historical articles, will find that the article on Black Letter, by a very eminent anonymous contributor, contains valuable new material.

FRANK HINMAN PIERPONT, who died on February 11th of this year, was a pioneer of mechanical composition. Our memorial gives a brief sketch of his career.

OPERATORS and all concerned with the technique of "Monotype" machines are reminded that we are anxious to receive short articles, technical hints, etc., and that we pay full space rates for all contributions. Baffling queries are invited.

Our next number will be our Annual Book Number, and in response to many requests we shall include a number of new "write-ups" of world-famous "Monotype" book faces.

Black Letter:

ITS HISTORY AND CURRENT USE

The rich, decorated black-letter is traditionally associated in England with royal pomp and pageantry. Hence at this season of rejoicing, the common reader has become accustomed to the sight of a kind of letter which was at one time more familiar to English and Scottish eyes than roman. To-day it is a "period face", outside Germany, and for that reason it is too often used incorrectly, when the user is unaware of the historical background of this particular "typographic heritage". The following article traces, and in some cases corrects and extends our current knowledge of the letter-form which once distinguished English, and indeed any Teutonic-language texts, from those in the international language of scholars.—ED.

The "Black English Letter", as Moxon called it, is now seldom seen. From the end of the 12th century, however, this same black-letter gradually overthrew the lighter, rounder, "roman" (as we should describe it—inaccurately, for it and "gothic" are both variants of the same thing) style that had been current for three centuries, and by the middle of the 15th century, when printing was invented, had completely superseded it. The black-letter style came to England from France in the 12th century.

In the last quarter of the 8th century the Emperor Charlemagne's huge programme of public works, roads, bridges, etc., turned to the provision of educational facilities, revised grammars, Bible texts and church books. For the more efficient despatch of the vast amount of writing necessitated by these schemes, Charlemagne determined to standardize a newly designed script. An Anglo-Saxon, Albinus, Alcuinus, or Alcuin, formerly the head of an internationally known scriptorium attached to the Benedictine monastery at York, was persuaded to take a leading part in Charlemagne's scheme. With his support, the Abbey of St. Martin at Tours produced a large number of sumptuous books of which the text was written in the new design now known to scholars as the Carolingian minuscule, in printers' language roman lower-case.

The example of the script of the Abbey of Tours, as it was developed in obedience to Charlemagne's decree which ordered the preparation of revised versions of the Bible, the missal and other Church books to be undertaken, inevitably affected the scripts used in other writing centres within and without his own empire. The technical excellence of the reformed Tours script, added to the prestige of their origin, soon induced similar changes in England. Moreover, the changes were the more generally acceptable because the Caroline script represented a conservative and by no means radical revision of previously existing practice.

What was involved in this 9th-century renaissance was not invention

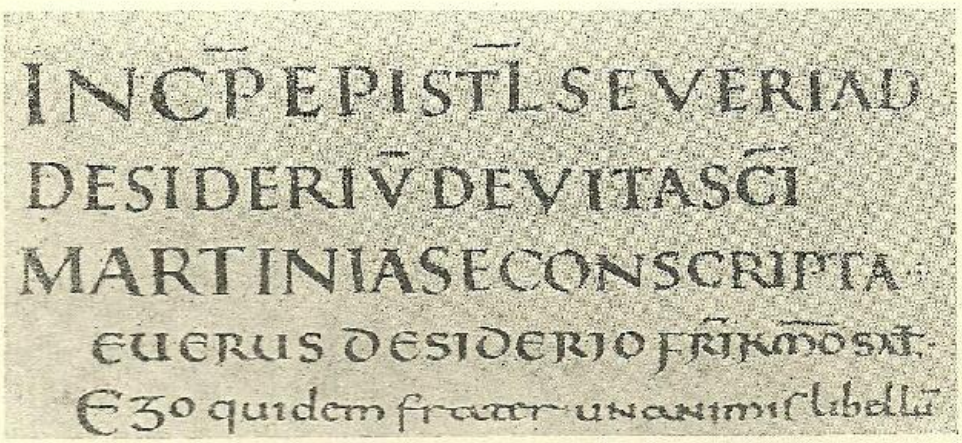

Fig. 1.—The "hierarchy" of Tours scripts: capitals, uncials, etc., in use as headings

but organization. The use of large inscriptional capitals for titles, large uncials for sub-headings and half-uncials for the initial phrases of chapters was not new; it was only organized formally. Important as this hierarchical ordering of scripts may be, and conspicuous as an element in typical Alcuinian books of the first class such as Bibles and sacramentaries, the detail of the greatest importance naturally lay in the body of the text, and particularly in the "lower-case".

But there was good writing done in the Abbey of St. Martin before Alcuin became abbot and before Charlemagne secured from Pope Hadrian a new typical edition of the sacramentary to serve as their exemplar. Indeed the foundation of the now famous Tours lower-case letter was laid before either the abbot or the emperor was born. The new script represents in fact the

ennobling of an earlier script which had become vulgarized, and not the invention of a brand new letter-form.

The best writing done before the 9th-century renaissance, whether in the Abbey of Tours or elsewhere this side of the Alps, was spoilt by prevalence of the habit of joining letters together which persistently attacks originally good models at all periods, and which, if permitted, always throws a script into confusion. The only way to preserve a script from corruption is to disallow all running-together of letters and symbols, the ligaturing of sorts, the abbreviation and contraction of words.

To revise in this direction the earlier 7th and 8th century hands was a first step in the new project. Thus, by purifying the previously used (now called

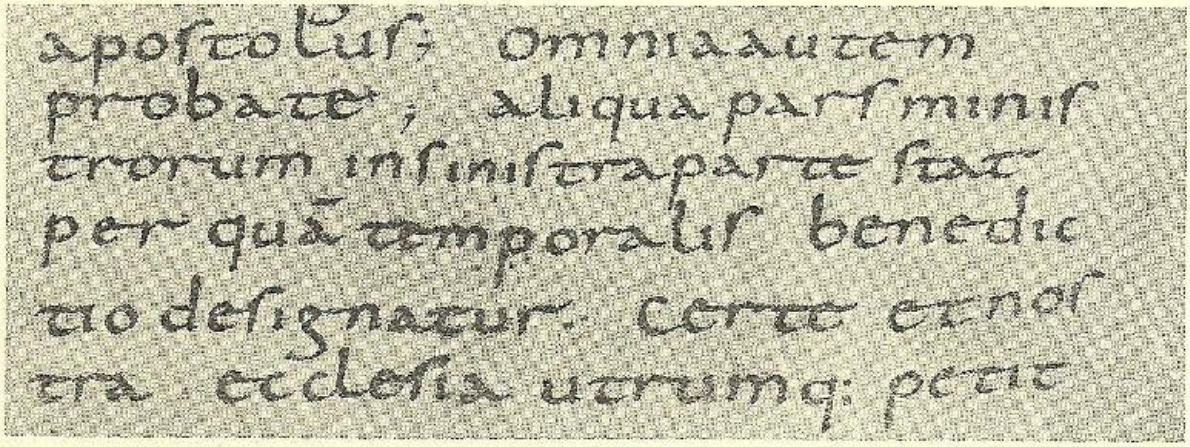

FIG. 2.—The Tours minuscule, or lower-case

Merovingian) script from its cursive qualities (the printer would say *italic* touches) *i.e.* from joins, flourishes and scribblings, certain writers at Tours had produced an improved script before Alcuin had even met Charlemagne. Some pages of a text of one Eugippius' anthology from the works of St. Augustine written, it is believed by Lowe and Rand, between 750 and 775, prove this point. But although this purification from cursive scripts prepared the way for a lower-case, this early script of Tours remained in its essence one of capitals and small capitals. It did include, however, a number of ascending and descending sorts such as b, d, l, p, q. The script was roughly an upper and lower-case but it lacked the consistency as well as the finish which Charlemagne had doubtless admired in the inscriptions at Rome. In fact the Carolingian letter, though based for conservative reasons upon the square and the circle, was not made in a manner calculated to ensure the permanence of the intended design.

The old classical monumental carved inscription letters, used for the best and most permanent type of inscription and carrying the greatest authority, were directly planned on the basis of the square and circle. On the other hand, the so-called Rustic capitals, reserved for the use of second-class work (in modern printers' parlance "jobbing letters") were made easily and speedily; they reposed upon no geometry, possessed little authority and no prestige. The later uncials and half-uncials, as designed for book work, were founded not directly but indirectly upon the square and the circle; they were not copies of the monumental inscribed capitals, but they had an analogy with them. The knowledge of these precedents and their geometrical bases controlled the Carolingian revisers to a very large extent. They were determined above all to remove the cursive habits

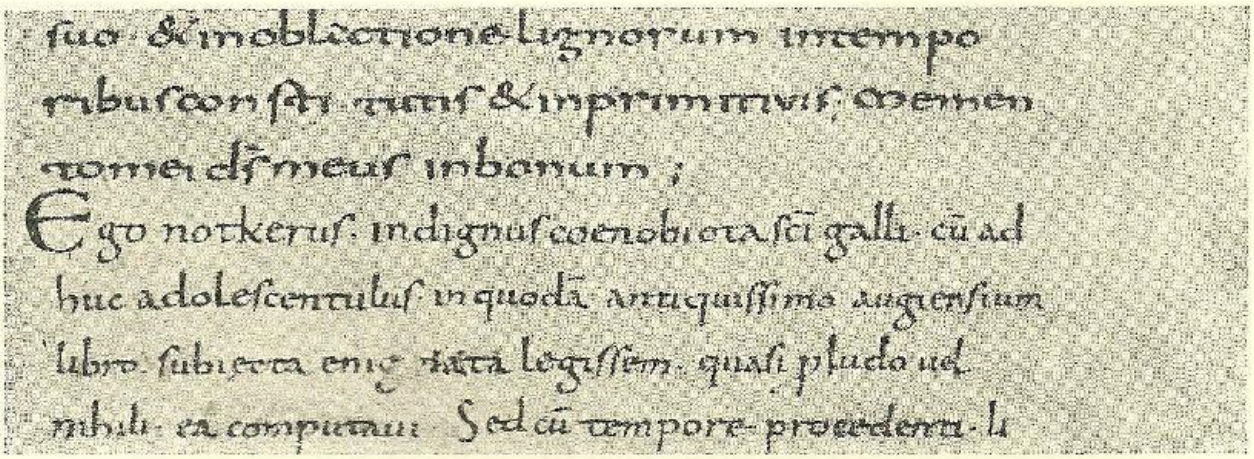

FIG. 3.—The Tours lower-case, the lower portion written quickly

which spoiled the Merovingian script used in the Frankish dominions before Charlemagne.

Their new "Alcuinian" script was upright, well spaced between words and lines; it was designed for use in the most important and precious books of the churches. It was not hurried, still less slovenly in its style. Like its predecessor, it is square in shape. But a very important difference in technique divides it from the pre-Carolingian letters: the former were written with a straight pen (*i.e.* a pen pointing directly to the right shoulder) while the new script was written with a slanted pen (*i.e.* a pen which pointed away from the shoulder). It was found more expeditious to write with a slanted pen than with the straight pen used for the best uncials and half-uncials, and, one supposes that in view of the immense amount of copying necessitated by Charlemagne's decree, a slanted pen was used for the new minuscule.

The position in which the pen is held is of fundamental importance to the future of any script. Unless (1) the manner of cutting the pen; (2) the manner of holding the pen; and (3) the design of the letter to be made by the pen so cut and so held are absolutely co-ordinated, the design of the script will be bound to change. It will change to the extent that these factors are unco-ordinated. Thus, if the authorized design is not made naturally by the pen but artificially by the will rather than the tool of the writer, scribes lacking in determination will gradually permit the design to accommodate itself to the pen's natural functions; and, equally, if the pen is not held correctly, the intended design cannot be achieved. The result will be a vulgarizing, or to use the word employed by scribes, a "bastardizing".

There came into the Tours script a contradiction between the intention of the

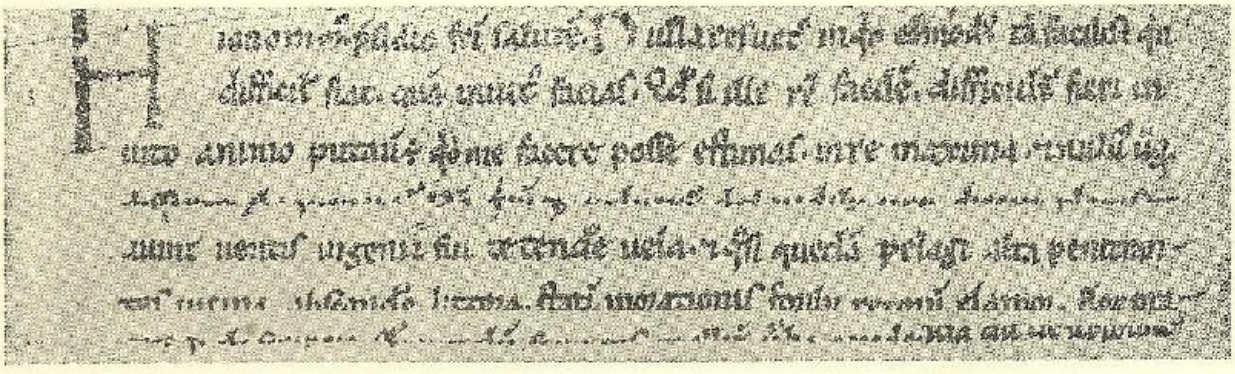

FIG. 4.—A text of St. Jerome, written A.D.1114, in a condensed version of the Tours script

design and the production of it. The intention was to produce a circular design which, given the Tours pen and the Tours method of handling it, could only be produced by a conscientious writer, for, it is important to realize, the use of a slanted pen always tends to encourage compression of the letters. The letter-form printers know as "italic" is only "roman" written quickly; it does not always need to slope but it always becomes narrower. This compression, in fact, is what we see slowly occurring even in the best classes of books written during the three or four generations following the general acceptance of the Tours model. Moreover, since the writing of Bibles, sacramentaries, etc., represented not the whole but a proportion, though large, of the writing done, the movement towards that condensation which results from a slanted pen is even more noticeable in legal, political and other documentary forms. Such subordinate scripts in time affected the senior scripts, and, by the end of the 11th century, the characters used for

Bibles and missals may be seen moving still more rapidly away from the original circular to a rectangular basis. Next, at the end of the 12th century these scripts, already condensed laterally, came under the influence of the lettering crafts associated with architecture, sculpture and building. Scripts were once again brought under the discipline of geometry. On this occasion, however, it was not the full circle, nor the full square, which was given authority over the alphabets. The old proportions and relations were set aside. Whereas the roman capitals had been drawn upon a basis either of a square or a circle (with the important exceptions of E F I L S V which were half a square across) the new script letters, though known to contemporaries as "square *(textus quadratus)* text", were drawn (with exceptions) upon half or even a third of a square. The initial stroke of each lower-case letter, curved in the Tours script, was sharply broken *(fractura, brisé)*

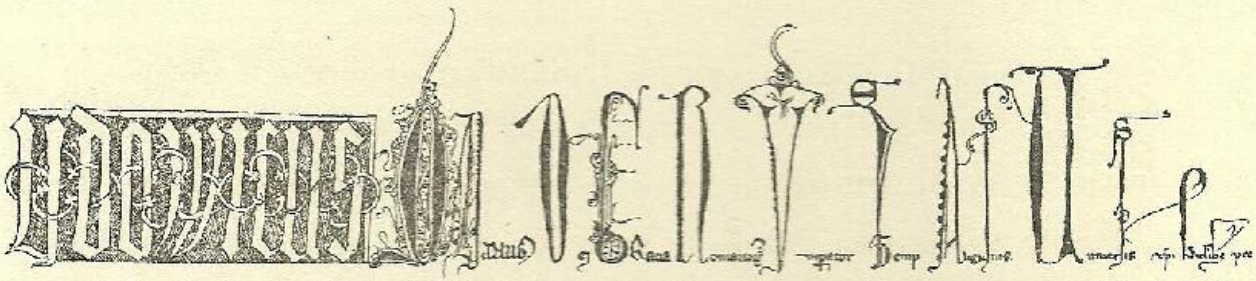

FIG. 5.—Heading [L]udowicus QUartus Dei Gratia Romanor[um] Imp[er]ator, etc., from a document issued by Ludwig, King of Bavaria, Munich, A.D. 1337

where it joins the perpendicular. Later the perpendicular was again broken at the foot. The perpendicular unit was based upon a number of small squares, say four, of which the head or foot accounted for an additional one each. Breaking the feet of perpendiculars as well as the heads is a later convention, and a pure piece of designer's logic. It obstructs the free making of the letter and never occurred in the early period of the history of this script. At its best the Pointed Text letter is a strictly logical multiple of units of the lower-case i.

The strong influence exercised by architectural lettering upon diplomatic calligraphy may be seen in a deed issued by King Ludwig of Bavaria in 1337. The initial letter in the title is followed by the rest of the name *Ludovicus* in characters written in obvious imitation of the metal engraver's technique. The lower-case letters in the subscription, though written freely with the pen, are as obviously influenced by the architectural crafts. It is certain that the black-letter originated independently in the necessities and conditions of calligraphy; there can be no doubt that the script was later dominated by the spread of so-called gothic architecture which took its rise in the north of France in the 12th century. The exaggerated perpendicularity and condensation of the script is less due to scribal than

to architectural conventions, as anybody who will take the trouble to examine inscriptions on tombs, brasses and the like, carved for gothic cathedrals, will discover.

The tendency to compress which has already been noted as a concomitant of the slanting pen is not so apparent in Italy as in the northern countries. Indeed it seems that there and in Spain the pen was held more upright; and for certain historical reasons. It would be only natural that Italy, which produced the uncials and half-uncials, and remained unaffected by the political and other necessities of Charlemagne's empire-building, should not abandon the old methods of writing in the interests of speed. The persistence of the old traditions of circular as opposed to rectangular writing may be seen not only in the Beneventan script but much

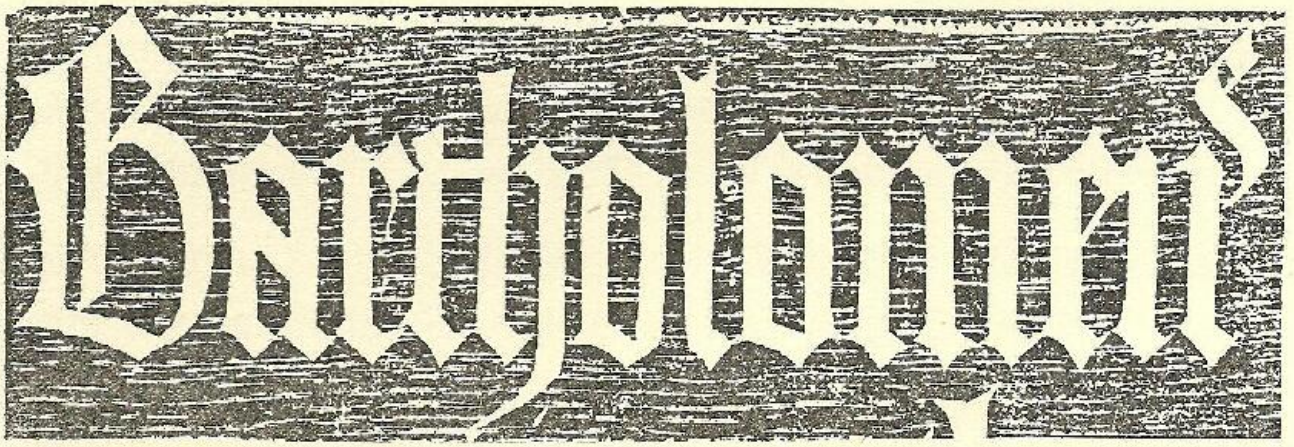

FIG. 6.—Portion of the title-page of Wynkyn de Worde's edition of Bartholomeus Anglicus De Proprietatibus Rerum 1495

later when, towards the end of the 13th century and the beginning of the 14th century, the northern black-letter style began to influence Italian calligraphers. The Italian variety of black-letter when it developed did not cease to be circular. The scribes of Bologna and Padua appear to have relished the additional colour of the northern lettering, to have liked a certain amount of pointing, but never to have approved the device of breaking the feet of the perpendiculars.

As it is found in Germany, Holland, France and England in the period immediately preceding the invention of printing, it represents the culmination of five centuries of subtle change in style and technique which took place so consistently in the same direction that it is difficult for us to realize that its parent was the circular script of Tours.

Thus, in the 15th century, when printing was invented, there were two varieties of text, northern (pointed condensed) and southern (rounded), employed

for the best book work. There were other more rapidly executed black-letter scripts for second class book-work and still others for legal and commercial work. There have come down to us a few specimen sheets and some fragments of sheets exhibiting the several hands taught by professional calligraphers of the period immediately preceding the invention of printing. The most complete document is that of Johann Vame Hagen of Bodenwerder on the Weser who advertises that he teaches books and legal scripts, also the art of making coloured initial letters. It shows a dozen ill-written scripts, of which eight are legal cursives and four are in text.

Most of the scripts shown in these writing masters' specimens were in due time cut in type for use in Bibles, missals, works of canon law, chronicles and commentaries respectively. Of all these there remain in use to-day in Germany the

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Aldine Bembo with Goudy Text; Aldine Bembo with Round Gothic
Aldine Bembo with English Text; Aldine Bembo with Bismarck Schrift

Baskerville with Goudy Text; Baskerville with Round Gothic
Baskerville with English Text and Baskerville with Bismarck Schrift

Centaur with Goudy Text; Centaur with Round Gothic & Bismarck Schrift

FIG. 7

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pointed northern European variety of black-letter, the rounded or Italian variety, the cursive known as Schwabacher and a romanized version of text known to-day as Fraktur, but whose contemporary name was Kanzlei or Chancery. For geographical reasons, the German founts, with the exception of the Schwabacher (used for the composition of Tyndale's Bible) never penetrated into England (Caxton). The London trade used the slightly rounder French founts for its models which were nearer at hand. The finest missals and breviaries, printed for the English market, came from the offices of the fine craftsmen who were at work in Paris and Rouen well before the end of the 15th century. Thus it came about that when the English typefounders began to cut black-letters of their own they followed the French model, and hence William Caslon's two-line Great Primer Black is almost identical with the 15th century French black-letters used in the magnificent missals of Wynkyn de Worde.

Roman type was introduced into England in 1508 by Richard Pynson. Italic was introduced in 1528 by Wynkyn de Worde. By the middle of the century a distinct tendency away from black-letter is noticeable.

The transition from black-letter to roman was, however, very gradual; it took place not for one reason but for many. The reading public during the black-letter period was a small public and the range of their reading restricted. Europe during the age of the monasteries read more narrowly than Europe in the succeeding age of the universities. In the next age, that of the renaissance, the reading public was still farther extended and the letter (they called it Antique) necessarily influenced printers because the humanists were the most regular buyers of books; naturally also they, with the possible exception of the Protestant and Catholic theologians, were the most prolific writers.

For these commercial reasons, English printers found that it paid them to follow the example of the Continental craft and gradually to supersede the black-letter with roman.

Garamond with Goudy Text; Garamond with Round Gothic
Garamond with English Text; Garamond with Bismarck Schrift

"Monotype" Caslon with Goudy Text and English Text
"Monotype" Caslon with Round Gothic and Bismarck Schrift

FIG. 8

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variety of literary compositions extended. Thus, in the four centuries after Charlemagne there had grown up a considerable public for books as books, in place of the small public for books as texts. It is therefore not surprising that the example of the Florentine intellectuals who directed the movement towards a revival of interest in the Latin and Greek classics should be emulated by similar-minded literary men in Spain, France, England and elsewhere. Thus secular printing intended for the consumption of men of this type followed the example set in Italy, a country which, as has been pointed out, had never wholeheartedly accepted the pointed black-letter. Secondly, this marked preference of the humanists for what we call the roman

This policy continued in spite of the fact that black-letter has many advantages. In figs. 8, 9, 10, the reader will observe the undeniable economy of black-letter, whether round or pointed, in comparison with the Bembo, Baskerville, Garamond, Caslon and Centaur romans. A striking difference is the length of the ascenders and descenders, for, whereas the fine strokes of the roman necessitate long descenders, much shorter terminations suffice for the sturdy main strokes of black-letter. In consequence, black-letter not only possesses more colour, but is much larger on the body than roman. Yet, in spite of the increased height of the lower-case, the narrowness of the black confers upon it an economy of space which roman types were unable to

claim until the invention of the nineteenth-century condensed bolds. Indeed the assimilation by the roman design of the virtues peculiar to gothic was delayed for centuries; nor can it yet be said to be complete. We know that there is no need for long descenders in a bold roman of any size, and none for long ascenders in a bold roman above 14 point. But it is less commonly realized that the economic requirements of jobbing typography are best served by the employment of bold roman types in which the capitals, for example, are 24 point and the lower-case 36 point. This is agreeably accomplished if, as regards ascenders and descenders, the standards of the mediæval calligraphers are respected.

But in spite of the many virtues which black-letter possesses, and which roman does not possess, it has inherent limitations. Owing to its history, black-letter, as used by printers, was handicapped with an upper-case impossible to use in combination. Black-letter is essentially an upper- and lower-case letter. It cannot be used as a titling except in upper- and lower-case. For this reason alone, therefore, it is inferior to roman as a medium of display. Indeed, black-letter encourages in the place of display that most undesirable of all substitutes, namely, flourishing. The elasticity of the roman alphabet, permitting in its simplest form a display of words in both capitals and lower-case was further increased by the invention of small capitals, permitting

FIG. 9.—From the title-page of Hölzel's *Missale Secundum Chorum et Ritum Eystetensis Ecclesie:* Nürnberg, 1517

display in caps and smalls. Finally, an enormous increase in the efficiency of the roman letter resulted from the invention, development and assimilation of italic. The novelty of a duplex alphabet was so great that italic was for a long time used indiscriminately for proper names and place names as well as for emphasis and other means of distinction and display. It was obvious to printers who had now learned the elasticity of the new typographical material that the only possible position for the old black-letter was in titles, in particular the titles of pamphlets and newspapers. By the end of the 18th century, nevertheless, the letter was virtually dead for anything but antiquarian printing.

Black-letter, however, remains a monumental design witnessing to the competence and style of mediæval craftsmen. The most unsentimental amateur of the lettering craft cannot but watch its disappearance with regret; and, in so far as opportunities for its use present themselves to-day, welcome an intelligent revival of the historic script. Fortunately, during the past century, it has fittingly become associated with ceremony. Much of the publicity issued in connexion with the Coronation bears at least some lines composed in the traditions of English black-letter.

For historical, nationalistic and political reasons a form of the mediæval letter is encouraged in Germany at the present time. In response to demands, The Monotype Corporation has cut a number of newly designed letters in pointed text, rounded text, Schwabacher and Fraktur.

The decay of black-letter in England is not easy to explain. It would seem that the acceptance of Protestantism by the governing classes would have encouraged the maintenance of the traditional forms menaced at precisely this time by the new foreign script. It seems, however, that there was sufficient humanistic influence to give the humanistic book script a welcome, and the Chancery humanistic cursive was preferred as a medium of correspondence by academic persons using Latin as a medium. The use of black-letter naturally persisted in circles untouched by humanistic studies, and thus we find that, whereas Latin books were composed in the new humanistic roman, books in English were composed in black-letter. The Primer in English and Latin, printed by J. Kingston and H. Sutton in 1557 used black-letter for

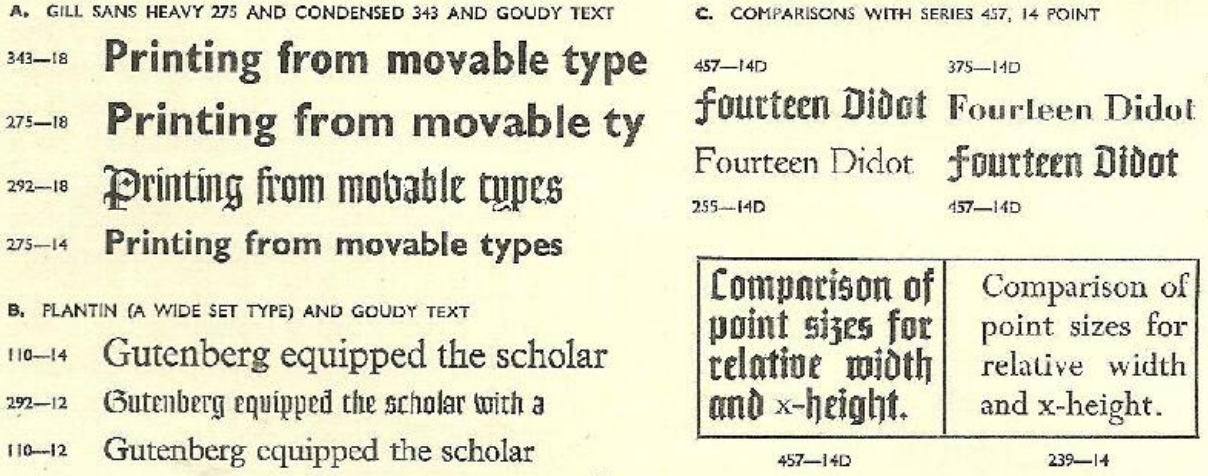


FIG. 10

the English prayers and roman for the Latin.

In consequence, black-letter became known as "English". Moxon, for example, discussing the cutting of letters in 1696, refers to roman, italic and black English letter, and it was termed "English" in the eighteenth century by John James amongst founders and the University Presses amongst printers. William Caslon called it "Black".

Caslon's description unquestionably points to the function of the letter. The face that we know as bold, or black, or fat, was not invented until the nineteenth century. Throughout the previous history of printing, therefore, the black-letter was the only bold available to an English printer; hence its employment as a titling on newspapers, pamphlets and title-pages long after the roman letter had been accepted for the text. Black-letter is to-day seldom seen except in the composition or decoration of deliberately archaic or "churchy" printing. As a letter form in England it is so dead that on the rare occasions when it is called for calligraphers almost invariably produce a completely ignorant version which, often enough, confuses the capital "O" with the capital "E" and the capital "E" with the capital "G".

The complete supersession of black by roman is not easy to explain. It might well be thought that the many virtues of black-letter would have protected it from competition of a light face. Black-letter is first of all all black. Secondly, it is large on the body, thirdly it is condensed and economic of space. Its perpendicularity assisted a further most practical economy, that of abbreviation. Modern printers who have to use diphthongs know how badly they compose. It is not possible agreeably to combine curves. Pointed text, however, allowed a whole wealth of abbreviations to be easily and agreeably constructed to the great convenience of printers working for a double-column folio layout. The complex layouts necessitated by the commentaries upon canon law, in which a double-column text was surrounded by a commentary, itself carrying an apparatus of footnotes, would have been almost impossible in roman letter, and would have driven the book out insupportably.

These characteristics combined to give black-letter the greatest typographical value with the least expense of space and with no lack of legibility when the design itself was as familiar to its readers as roman is to us.

Frank Hinman Pierpont

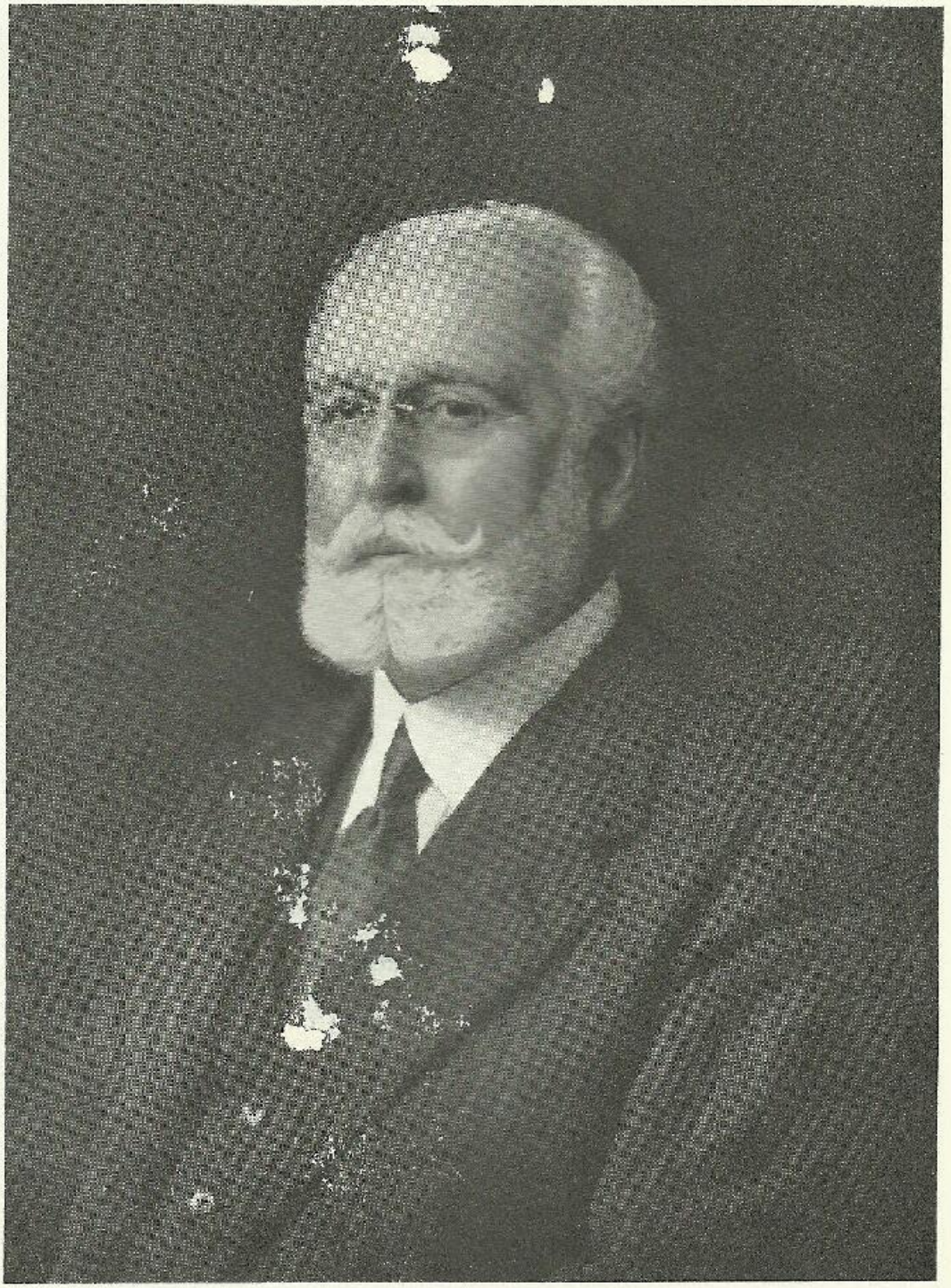
1860-1937

A Memoir and a Tribute

When a man of outstanding vision and capacity as an engineer solves a basic mechanical problem in such a way as to make possible a vast industrial development, his name is remembered and revered as long as that industry endures. Of Frank Hinman Pierpont it will always be remembered that he was an engineering genius whose improvements of mechanical punch-cutting and matrix-making proved "key inventions" in establishing the success of "Monotype" machines; and anyone who has at any time visited the Monotype Works at Redhill, Surrey, is probably aware that the fame which this factory enjoys amongst engineers, for feats of "precision construction on mass scale" is a monument to the skill and executive ability of the man who for 37 years was responsible for its management. But the new visitor can no longer see the "presiding genius" of those Works in his office, or strolling along the aisles of whirring machinery with that quick and unerring glance of a man who knew every microscopic operation intimately. These notes are therefore offered as a personal memorial, in the certainty that future generations of students of typographic history will wish to know what manner of man the late Frank Hinman Pierpont was—and to know that his contributions to the printing industry were appreciated in his own day.

It was late in the year 1897 that the Lanston Monotype Corporation was formed in London, and in those early days the Company was not in a position to manufacture the machines in England and therefore procured them from the Lanston Monotype Machine Company, of America. Its offices and works were then in the same building in Drury Lane, London. In 1899 its works were transferred to Salfords, Redhill, Surrey. In the early spring of that same year Frank Pierpont was invited to come from Germany, where he had been engaged in re-designing and marketing the Typograph, and to take the position of Works Manager to the Lanston Monotype Corporation.

He was in his thirty-ninth year when he entered what was to be his life-work, and heredity as well as circumstances had fitted him for this task. He was in the truest sense an American aristocrat; one of his forefathers was James Pierpont, a founder of the city of New Haven in Connecticut, U.S.A., and of the college that became Yale University. In Frank Pierpont's bearing and manner one read authority, even autocracy: he was a born commander of men. Yet in his youth he had had the experience (to him, an advantage) of strenuous manual labour in farming during



his school holidays, and of clerking 90-hour weeks in a general stores. At the age of 20 he was apprenticed to the Pratt & Whitney Co. of Hartford, Connecticut, where he spent the leisure of a 60-hour week in research in the literature of mineralogy. One of those who gave him access to the Hartford libraries was Samuel Clemens, better known as Mark Twain.

In 1885, joining the Parent Lawyer, Albert H. Walker, he gained his first knowledge of composing machinery in the preparation of Patent Office drawings for the Paige Typesetter and Distributor.

At the end of 1894, a question of German patents took him to Berlin, where he remained for some time. There he met Miss Zoe Abby Moore, whom he was to marry in Vienna in 1897. Already his acumen as an engineer had become evident. The Ludwig Loewe Company had acquired the European rights of the American Typograph, and Frank Pierpont, joining that Company, radically redesigned the machine and assisted in marketing it.

At this time, this crucial decade in modern printing history, the idea of mechanical composition had absorbed incredible sums in experimental work, and would still have seemed to the average printer a "mad idea", had it not been for the tremendous pressure of demand for the printed word caused by universal literacy, and the steady rise of wages. Under that pressure, it seemed more reasonable to envisage a time when, from the welter of conflicting claims, certain machines would emerge as destined for the twentieth century composing room. But it took mechanical insight to see beyond the demonstration machines to the hidden problems of large-scale manufacture, equipment, etc., and above all to deduce from the primary or inherent advantages the future possibilities of any type of machine.

One of the less-obvious but very important problems concerned the manufacture of matrices.

The modern composing machine has made printers revert to their practice in the sixteenth and seventeenth centuries, of casting their own type on the premises from purchased "strikes", i.e. matrices. No type-composing or line-casting machine could have gone beyond the theoretical success of experimental models, if one basic invention had not made it possible to duplicate punches precisely, and thus to produce two absolutely similar matrices of a given letter years apart, with the first punch destroyed. Curiously enough, this invention (by Linn Boyd Benton) was of a machine meant to eliminate the cutting of punches, by engraving matrices direct—as typefounders now do: they have no need for more than a single matrix of any letter. But the principle embodied in Benton's patent—a means of pantographically-controlled engraving with a whirling tool—could be adapted for mechanical punch-cutting, and had the Benton-Waldo machine not been available for that purpose, the success of mechanical composition would have been halted for a generation*.

But accurate as were the Benton-Waldo machines used by the Lanston Monotype Company in its early days, they required highly-skilled operation, with a low rate of output. These handicaps were surmounted by Pierpont in a new punch-cutting machine of his own design, which enabled semi-skilled operators to produce punches of an accuracy varying within one ten-thousandth of an inch, and to do it at a speed which reduced the cost to one twenty-fifth of what it had been.

THE QUEST FOR PRECISION

The Works that grew up under his control reflect on every hand his passion for accuracy and efficiency. Steel is a wayward metal, and the tempering of steel punches by perfectly controlled automatic electric action constituted another inventive triumph. Still others are found in the matrix-cutting department, where Pierpont's knowledge of optics enabled him to develop uncannily accurate gauging, testing and positioning devices. Other special optical devices were invented to obtain microscopic precision in the making of type drawings and of the patterns used on the Pierpont punch-cutting machine.

The vast range of characters cut under his supervision included a number of his own design. In a generation in which artists design sans-serif types in the attempt to "reflect the age of engineering", it is interesting to note that this outstanding engineer, this creator and leader of machines, entertained no such theories. Indeed, the specimen which he took particular pleasure in showing to favoured visitors was a page set in "Monotype" Poliphilus, printed on ancient paper in exact facsimile of the first page of the Aldine *Hypnerotomachia Poliphili* (1499). He would present that page along with the original first page, and smile demurely when (as often happened) the visitor failed to guess one from another. The beauty of any fine type

* Those interested in the early development of mechanical composition should consult the series of articles by Mr. Henry Lewis Bullen in the *Inland Printer*, 1924. In the April number of that year F. H. Pierpont's contribution is recorded, with biographical details and a portrait.

pleased him, but Poliphilus had to him the special charm of unusual difficulty in reproduction; it was a problem worthy of his steel tools, for it was a facsimile of ink impressions—an impossible task for the hand cutter.

In July 1936 the Directors of The Monotype Corporation met at a lunch at the Savoy Hotel on the occasion of F. H. Pierpont's retirement as Works Manager.

Sir R. Geoffrey Ellis, Chairman of the Corporation, explained the object of the festivity, a presentation as a token of esteem, and told the other guests of Mr. Pierpont's new appointment as Consulting Engineer with a seat on the Board. Lord Askwith, as the senior Director, made the presentation. He recalled, from personal memory, the years in which a nucleus factory of two small shops grew to its present dimensions and modernity, and remarked that the guest of honour, after so many years of work in adversity and prosperity, still had the appearance of youth.

Mr. Pierpont, continued Lord Askwith, was not only an engineer and an inventor, but also a collector. In his beautiful house in the country, he had a collection of 150 liqueurs, not one of which he had ever himself tasted, but which were at the disposal of his friends. Not only did Mr. Pierpont's beautiful house in the country contain these rare liqueurs, but in his garden was to be found a very fine collection of roses. When, therefore, the Board of The Monotype Corporation determined to present to Mr. Pierpont a slight token of the respect in which they held him and his work, they considered it appropriate that the presentation should take the form of the object which he had the pleasure of unwrapping and presenting to Mr. Pierpont, namely, a Silver Rose Bowl.

As the guest of honour rose to reply, his voice (enfeebled by a recent illness) alone betrayed the advance of years, and the degree to which he was affected by the sincerity of appreciation amongst his hosts and fellow guests. His snow-white beard, always so precisely trimmed, seemed almost like a deliberate disguise on a man with so youthfully clear a complexion: the broad shoulders that spoke of phenomenal physical strength were scarcely bent.

But the illness that was then upon him was to prove fatal within the year. Those who knew him, knew to what extraordinary degree he possessed the "engineer's temperament", and knew that such a spirit could not have tolerated the indignity of senescence, the slow breakdown of the human machine. He was spared that experience. He became ill, and through illness enfeebled: but in his 77th year, at his death on the 11th February 1937, he had not yet grown old.

His name and work will survive in the history of typographic engineering: and his vivid image as a personality remains with everyone who ever met him, or even saw him in the distance and recognized that courtly and impressive figure as Frank Hinman Pierpont, one of the carvers of the destiny of mechanical composition.

THE ORGANIZATION OF A "MONOTYPE" MACHINE COMPOSING DEPARTMENT

An Address by C. E. BATEY *(of the Oxford University Press) to the* MONOTYPE USERS' ASSOCIATION
on February 25th, 1937

SEVERAL years ago I took an engineer round a printing works. He was not a printers' engineer and he had no knowledge of our trade or of the technique of our trade, but he was really a first-class mechanical engineer with a wide experience in making, examining and in supervising the manufacture of precision machinery. He thought the letterpress machines very simple and uninspiring; our method of making ready with patches of paper he considered crude, as indeed it is, and his remarks were caustic and humiliating. The foundry and the bindery aroused no enthusiasm, and it was not until we came to our plant of "Monotype" machines that his mechanical interest was aroused. "Ah," he said, "here is a machine at last!"

Now, we who live with "Monotype" machines day after day take for granted the performance and the service they give us, because they are so perfect in design that they perform that service with little complaint and less interruption. But this should not prevent us from giving the machine proper consideration, or from providing it with fair conditions.

We are all aware of the gibe that the typefounder's product is vastly superior. I suppose this may be true in a few isolated cases, but wherever it is true the fault lies with the user and not with his "Monotype" machine. Let us compare for a moment the performance of the typefounder's machine and a "Monotype" machine. The founder's machine casts separate types, separately sized, aligned and cast. He uses a metal rich in tin-antimony, casts relatively slowly in a fixed body mould in which mould and matrix are nicely heated. He examines each letter minutely and rejects the bad castings.

A "Monotype" machine does not merely cast type; it also composes type. All the time it is drawing upon a matrix-case of 225 or even 255 characters and spaces; selecting, sizing the width, casting, spacing the lines, and assembling them in the galley. The machine will do all this and produce type which is perfect in face, body and feet. Need I say that you will make sure of this performance if you make sure that the machine is operated under proper conditions?

And what are the proper conditions? Let us admit at once that they may vary in detail but not in principle, and that it is principles which concern us to-day. Unfortunately, or fortunately, none of us can escape the influence of our individual experience, and I am no exception to the rule. Therefore, I hope you will bear with me if I speak largely from my own experience as an officer of the University Press at Oxford. Yet I shall not fail to go outside this experience if at any time I feel I should discuss a better alternative.

THE EQUIPMENT AND ITS ACCOMMODATION

We may safely lay it down as our first axiom that good and properly balanced equipment is the foundation of a good organization. Of course we are all of us committed to the equipment we already possess for longer, or shorter, or indefinite periods: but this need not deter us from the consideration of ideals.

But what keyboards have you got; are they D or DD? What casters? Is the proportion of one to the other entirely suitable for your work? And what of your equipment? Here is a matter which will test the balance of your plant, and, fortunately, if it is at fault the remedy is more easy to apply. An examination of your daily dockets over a period will reveal the gaps. And, of course, you use daily dockets for all your productive workers, operators and attendants, in the department.

This is important. If you lack any fount which a customer calls for, your attention is likely to be called to the fact very soon, either by your staff or the customer; and the importance of this customer, and your knowledge of him, will probably assist your decision to buy the matrices and equipment for the missing fount or to offer an alternative. I realize that emergencies or an unusual run on this or that fount may place

any one of us in difficulties: but as soon as we are satisfied that an increased demand has been established we should make good the deficiency. On the works side you cannot afford to lose caster time and it is surprising how the wasted hours mount. Nor can you afford to lose customers because your equipment shortage has delayed his work.

The accommodation of your plant also deserves, and no doubt it has received, very careful consideration. But all "Monotype" machine plants are not above reproach in this connection. The most modest installation represents a large capital outlay. Equipment of this value for hand composition would require a fairly generous share of your floor-space, but the keyboard has been found in all kinds of odd places and the caster machine has been pushed into any odd corner from cellar to garret.

The keyboard may not be a very expensive machine, but it is part of a valuable whole, and it employs valuable labour and you want to get the most out of both. Therefore, give your machine and operator sufficient space, he doesn't need a lot; quiet, and freedom from other distractions; good north lighting in the daylight hours, and the best artificial illumination you can provide in the hours of darkness. For this purpose I suggest an adequate system of general illumination, supplemented by individual lighting such as that offered by a flexible holder of the Terry pattern. Give him a locker to hold copy and the tools and semi-personal things he is sure to have, and a hanger for his coat. Give him a good, sound, comfortable chair. If you have a fancy for something of the Tan-sad pattern, well and good, but an ordinary honest chair is just as welcome as long as it has a nice wide seat and a proper back support and doesn't creak every time he moves. And keep him warm: there is no need to "molly-coddle", but cold fingers never earned dividends in a keyboard-room, and any loss will be yours, not his.

His equipment, which will surely grow, should be stored properly: spare drums and stopbars in their proper places and keybar frames off the floor and out of dust and danger. It is a good plan to retain these in the excellent boxes in which The Monotype Corporation delivers them. Built one on top of the other, they make an excellent rack which is as nearly dust-proof as anything can be, reasonably cheap and economical in space. Two rows of these facing inwards to form an alley is most impressive and convenient.

Much of what I have said about the keyboard may be applied to the caster, but although the attendant will not require a chair, you must make other provision for his equipment. If your caster stands on a cement floor, then wooden floorboards are to be recommended. They allow you to lay your gas, power and water pipes on the floor so that you avoid the need for channelling and they provide a more charitable stance.

A good bench should be provided, with a vice for cleaning pumps, and partly metal-covered for cleaning matrix-cases and so on. This bench may be provided with cupboards underneath for spare parts and other odds and ends. At the back, and resting on the bench, provision may be made for the equipment: moulds in their boxes (always put away clean), wedges (stamped with identification marks) in racks, matrix-cases in runners, a place for everything.

You will also have a random and room for galleys, proofing-press and paper.

The caster room should be properly ventilated, and if you have a system of gas heating you will give each machine a cowl to carry off the fumes. The choice of gas or electricity for heating may be influenced by the cost of the supply in your district. Gas, with an automatic heat regulator, is good, but an electric immersion heater provides a more perfect control of temperature and is to be preferred.

The pump and compressor need a little space, but demand, and receive, very little attention. But if the plant is reasonably large a spare equipment is a valuable insurance against a breakdown which would stop the whole plant, keyboards and casters. A pressure gauge is useful in the keyboard-room to show any change in the pressure supplied to that department. A cistern of water is a useful provision against the sometimes frequent, and often unannounced occasions when the authorities cut off the main water supply.

If the department is large enough to carry a mechanic he must be provided with a suitable bench and all the precision tools which are necessary for his work.

PERSONNEL: SELECTION, TRAINING AND DUTIES

We must now consider the personnel and their selection, training and duties. The keyboard operators may be divided into several classes. Most of us are concerned with only two of these classes; the rather slow man who is very clean and the man who is a little faster but not so clean. The really dirty man is not to be tolerated, whether slow or fast, because he would still be an extravagance if he worked for no wages. The man who is both really fast and really clean is a very rare person, and he generally possesses qualities which bring him promotion early in his career, and he is lost to the keyboard for ever.

Recruitment may be from the outside, but in this event the men may place a premium on their experience, which may make their employment expensive without making their quality certain. Another way is to train compositors who have experience of the work which is produced in the plant. These may do well, but the fact that they have been good compositors is no guarantee that they will make good operators. And, of course, you have to bear the cost of their training. Probably the best plan of all is to put promising apprentices into training while their fingers are still nimble and before they have settled down to other tasks. Their fitness or otherwise is determined very soon, and if they go on the keyboards early enough they may receive a good grounding in the plant and a final finishing course at a Monotype school. The result can be very good indeed.

Caster attendants are less difficult. I don't suggest for a moment that anyone may be put to work on this machine, but I think it is true to say that intelligence, keenness, common sense, and good eyesight are the essential qualifications for the task; while the somewhat higher standard of education and the long and careful training which is necessary for the compositors would be wasted on this machine. I am aware that there are houses where the caster attendant may be called upon to help at case, and in such instances the man must be a compositor and be paid at the compositor rate. But these conditions prevail in relatively few houses, and where there is full-time employment on the caster it is a waste of skill and wages to put a compositor on the casting machine. Here it is probably best to commence training at the age of 14 or 16 and to give the lad all the experience you can until he is 21, when he is fully qualified, and earns the full rate under the agreed scale of wages for a caster attendant.

Turning to duties, those of the keyboard operator are so well-established that we need not discuss them. But the work of the caster attendant may be more varied and less clearly defined. Thus he may have one or two composition machines, or a sorts casting or jobbing machine, or a Super Caster. Every house must have the organization which best serves its particular needs, and these may differ widely from place to place. This is particularly correct of the smaller printing offices, but I believe it is true to say that the medium-sized and larger houses conform more closely to a pattern.

Each attendant, then, should run two machines and be responsible for changes of moulds, matrix-cases, measure, wedges, and so on, and for body, set, height to paper, alignment and the quality of type from face to feet, and the cleaning of his pump and the condition and temperature of his metal. He should also be quick to note if wrong characters are being produced or if any bad letters indicate worn or damaged matrices. Of course he should detect immediately if there is any mechanical fault in his machine or its equipment. As soon as a galley of type is run off it should be pulled up and a proof given to the attendant, who should then examine it for all the faults which I have mentioned in case he has missed any.

"MANAGEMENT FUNCTIONS"

But there are certain duties which are more suitably placed in other hands, and here I still have the larger plants in mind. After all, your money is invested in these machines, and they should be kept running: the attendant should not have to interrupt production in order to perform tasks away from his machine, whether at the bench or elsewhere. And he certainly should not leave his machine to run unattended if you expect to get good type. Thus the foreman is the person who is ultimately responsible for sizing-up, alignment, and the quality of the type cast. This is an essential management function, and the management should arrange for the preparation of matrix-cases, the cleaning and repair of moulds and the maintenance of the casting machine; just as it gives out the work to be done, delivers metal to the machines, provides a supply of empty galleys close at hand, and employs a proof-puller to pull proofs. None of these duties should take the attendant from his machine even if he is competent to undertake them: and some are clearly outside his competence.

Our own plant is a large one, but in addition to the foreman in charge of keyboards we have three responsible officers within the caster department working under the direction of the manager of the whole department, keyboards, casters and make-up, who is himself a "Monotype" machine expert. One of these is the sub-manager who is responsible for the quality and quantity of the output. He moves about the room checking, examining and organizing. He also takes down and cleans moulds and is qualified to undertake certain repairs. His assistant helps him in these duties and pays more particular attention to the machines producing sorts and display type. The latter is also responsible for all the matrices, and for the matrix-cases, which he himself makes up when necessary and hands to the attendant ready for use. The third officer is the mechanic who is responsible for the efficiency of all the plant and equipment but has no executive authority. The mechanic is qualified to undertake adjustments and most repairs to the machines, and cleans and adjusts the moulds.

Thus the duties and the responsibilities of everyone in the department are clearly defined and we secure what we believe to be an effective administration within the department.

ORGANIZATION OF WORK

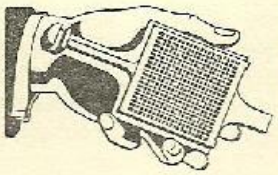
Again, different or differing conditions in our plants will dictate our practice in the reception and the preparation of the jobs which come to us. But, speaking generally, there are certain stages through which all work should pass.

When the work is received in the order desk, the appropriate forms are filled up, and it may well be that at this stage the details which it is possible to give by way of direction are somewhat meagre. But, at the least, the job will get its order and number, and this order will carry the name of the job, the customer's name, certain already determined data about page and paper sizes and the number and style of proofs. If the job has not already gone through the layout department, the design should be completed and the clearest directions drawn up for the compositor. In the next stage the work will pass to someone who is responsible for the style of the house. This may be a foreman or his deputy, or, in a larger plant, there may be a staff assigned to this duty. But whatever arrangement is adopted it should ensure that the copy is most carefully examined, that all possible matters of difficulty are discovered and settled, and that everything is marked up in such a way that the style is clearly indicated all through the work.

It is clear that the complexity of this duty will vary greatly according to the class of work which is handled in the plant. In many instances the task will be a light one, but whether light or heavy, it is a work which must be properly done if we are to secure the maximum output from our "Monotype"

machines. It should not be necessary for the operator to have to refer back to the foreman, or another officer, for directions which have not been made clear. This is not only a waste of time but it disturbs the progress of the operator; and unless he succeeds in picking up everything which the editorial function has missed, the trouble is carried forward to the reader, who wastes his time with the question, and any alteration which may be necessary becomes a burden in house corrections.

There is another difficulty which does not concern us all, but which, where it does occur, can cause a good deal of delay and trouble. I refer to the sorts which the job may demand. If the class of work which is being handled is known to throw up demands for special sorts, then it is wise to establish some routine for their listing, preparation and ordering before the work is put in hand. Nothing is more disturbing when you have a job well under way than to have your attention drawn to sorts which are required, but which have been over-looked. And if the job is an urgent one, under promise perhaps, and you have to order, and it may be, wait for a special cutting, then your difficulties become acute.



We carry a good many special sorts and accents, and the ordering and recutting of these is placed in the control of one man. He has a list to which he adds each acquisition as it comes to us. And to him is sent for examination any copy which shows any sign of the presence of anything out of the ordinary. In practice most of this work is done in the estimating stage, but there are occasions when the copy is not available until it has to be put in hand.

Now, with everything properly prepared, with our order sheet carrying the basic directions of the order desk, to which have been added the details of design by the layout department, and clear directions of style by the editorial department, all goes forward to the keyboard operator through his foreman, overseer, or departmental manager. If our work of preparation has been correctly done we can leave the operator to his task, and there is nothing much more we can say about it. I do not suggest that the rest is merely a matter of routine: what I mean is that the task is one for which his special training and long apprenticeship have fitted him. As he completes each spool, he will add a label which identifies the job and provides certain essential details for the caster attendant. And of course, at the end of each day he completes a daily docket showing exactly how he has spent his time. I shall return to both the spool label and the daily docket later.

And now the work has arrived in the caster department where it is distributed to suitable machines and men. But here let me say, in parentheses, that we must be careful that we do not give any man a stake, as it were, in any special kind of work, either in the keyboard room or the caster room. It may be that you have a periodical which presents some difficulty. If you confine this work to one operator you are bound to run into trouble sooner or later. Should illness overtake your man, you will be in trouble at once. Returning to the caster department again, we shall order things, as far as we can, so that we suffer the minimum of lost time through changes of moulds and matrix-cases. And as I have said before, matrix-cases should be prepared beforehand, and everything should be made as easy as possible for the attendant, so that he may concentrate on whatever change-over is necessary, and get on the run again with the minimum delay.

In all but the very smallest printing offices it is necessary to keep track of the work which is passing through. This system may be somewhat elaborate of necessity in a large house, and I am going to describe the method which we use, not because I suggest this for any other house, but because it illustrates a principle.

We prepare four daily returns for our "Monotype" machine department. The first is a complete list of all the work in that department including books waiting to go in hand, and all oddments, at 8 o'clock each morning. The items carry the date of their reception in the department and are starred to indicate the degree of their urgency and are followed by a K. or C. or both, to show if they are actually in hand in either the keyboard or caster department. The second list shows the work which is on each keyboard at 8 a.m. each morning, and on this list is indicated the date or time of the probable termination of the work, and the job which is to follow it. The third list shows the work at each caster at 8 a.m. every morning and against the job is shown the number of spools which remain to be cast. The fourth list is a record of spools cast during the preceding day with an analysis of the total production for each principal customer.

Such a system is no doubt too elaborate for the majority, but it illustrates the principle of keeping a track of everything which is so essential if we are to move things along evenly and avoid disappointment which may mean the loss of a customer. On the other hand the principle can be made much more elaborate. It is possible to have an indicator calendar carrying each keyboard and caster in a separate column. On this there might be an indication of the job on each machine, filling the calendar to the expected date of completion. Then each main part of equipment, such as keybars, moulds, and matrix-cases, might have a tab label which would be attachable to the moving job, and a "store" section would indicate everything free at any time and available for immediate use. One can easily fill in the details of such a plan, and its completion would form a pleasant exercise in administration; but as I have said, this would be an elaborate system and only suitable for the larger plants and those handling longer works.

OUTPUT RECORDS AND COSTING

I propose to make only the briefest reference to costing, but, of course, it is an important department of the organization and one in which we are all interested. In passing I

commend to you a Monotype costing booklet which was specially prepared by your association. It is quite refreshing to re-read it occasionally.

I think it is true to say that few people have any record of output, and yet I can think of no department in which such statistics are more valuable or more revealing. Very few applicants for employment as operators confess to an output as low as 7,000 ems an hour, and the majority are much more confident of their ability, and cheerfully profess a speed anywhere between 10,000 and 20,000. The strange thing is that they believe this to be true. The fact of the matter is that to set a carefully chosen set-piece is one thing, and to deal with the actual copy which provides the daily work of a printing office is another.

There are certain obvious ways of securing this record, and a Monotype costing booklet suggests one plan. But anyone can readily devise a system to suit his own needs. With us it is quite simple. We begin with the operator, who completes the spool label I have mentioned before. This he sticks on the spool which eventually reaches the caster attendant, who, after casting, passes spool and galley to the proof puller. Now the proof puller has an electro (several duplicates in fact) which he places on the galley so that when the matter is pulled there is provision for certain details of identification. At the end of the day these proofs are gathered together, and are handed into the costing department.

Meanwhile the operator and caster attendant have completed their daily dockets, which are also delivered to the costing department. These dockets carry two additional columns which have been left blank: they have no printed headings but are for the recording of the output against the time spent on the work. Each galley is cast off and the result entered in the column. This is actual output, but if the copy presents unusual difficulty, an extra credit is allowed for this and gives a figure known as the "credited output". These figures are entered daily on specially ruled sheets to show both individual output and departmental output; weekly, monthly, quarterly and yearly aggregates and averages are then worked out and summaries are made.

All this may sound rather elaborate, but it is not so in practice. Indeed two girls of the costing department take the work in their stride. On the other hand it is difficult to calculate the value of a really honest record of output. We find many ways of using the records, and we consider that the relatively small cost of gathering these figures is well spent.

MAINTENANCE OF PLANT

We should now say something about the problem of plant maintenance. Here again the conditions within the house will determine the staff which it is possible to assign to this work. If the plant is very small some of the work must be done by the man in charge of the department, while plants which are a little larger may have a skilled mechanic for the department. Where the department is large enough there is a definite advantage to be gained in employing a man on this work and nothing else, because he ultimately becomes a specialist and an expert.

As I have mentioned, in our own plant we have a mechanic who is responsible for the mechanical efficiency of the plant. It is his duty to make routine inspection of all the machines and to check up the production constantly. Minor overhauls and replacements are undertaken by him, and only for the larger overhauls or the fitting of the more complicated new attachments are our friends of The Monotype Corporation called in. Now in this work of maintenance we are concerned with the machines, the moulds and the matrix-cases. The machines are under constant watch by those who move about the room, and each caster attendant calls the engineer to his machine immediately in the case of a breakdown, and even when he notices anything unusual. Moreover the most valuable periodic inspections by The Monotype Corporation are a check on wear and condition, and we are always ready to act on the suggestions which come out of these inspections. Most of the work, short of a thorough overhaul which would make it necessary to send the machines to Fetter Lane, is performed by the mechanic.

The moulds are given the most careful treatment when they come off the machine, the mechanic takes them down, and cleans, examines and oils them before they are put away. The moulds undergo a routine examination every month when all sizes are checked and logged in a mould history. Immediately any agreed tolerance is exceeded, the mould is returned to Fetter Lane for overhaul.

The matrices are overlooked just as thoroughly. It is the duty of the mechanic to measure the height to paper of every fount put on. In the case of a low reading the mould record is examined, and it follows, that if the mould is correct, the matrices are at fault and must be replaced. The attendant, too, is required to watch carefully for any defect in the matrices, and this he does by careful examination of the metal as it is cast, and of the proofs of the matter which are supplied to him for inspection.

There can be no doubt that the efficiency and the economy of the plant are dependent on its condition. It should be our determined policy, which should be made clear to everyone in the department, that faults must be detected and remedied at the source, before any type is cast if possible, and certainly before the type is allowed to go to make-up. This is the only method by which we can confine responsibility, be reasonably sure of good type, and avoid the trouble, expense and dissatisfaction which follow the later discovery of bad quality. From my own experience, I am convinced that what may appear to be an elaborate system is well worth the care it demands.

ODDS AND ENDS

And lastly, a few odds and ends. The duty of melting and ingotting metal is one which does not always receive the consideration it deserves and yet it is surely one of the most

important functions of all. It is well worth while to employ a responsible man on this work and to take some trouble with his instruction and training. Good metal can be ruined by a few minutes neglect in the pot; and you can throw money into the dross bags which you will never see again. Remember that a five hundredweight pot of metal represents about £16 of your capital at present prices, and that these prices are rising rapidly. Give your man a good pot, and a thermometer; and persuade him to read, and read yourself, a good book on the subject.

I have not mentioned sorts casting and the casting of display type, leads, rules and furniture. A carefully-planned procedure for ordering and supply is necessary here, and an effective supervision. In our case all orders pass through a responsible storeman who exercises a strict control over demands, and who also determines the urgency of every demand.

It is important to see that there is liaison between the layout department and the department of "Monotype" machines. Before any design is prepared which calls for the use of any unusual combinations in the matrix-case, the artist should consult the departmental manager and secure his advice. Otherwise there is the danger of a plan going forward which may require much handwork which cannot be recovered. This should never be allowed to happen.

I have not mentioned stores and oils. A supply of keyboard paper will be kept in the keyboard room and it is usually satisfactory to leave this in the original containers. If used spools are preserved at all, they should be stored properly on shelves where they can be found. There should be proper oil containers for oils. In short, everything should be stored carefully to avoid waste of time and material.

I am very conscious that I have left a great deal unsaid on this matter, but I am sure you would not expect me to cover this very big subject in all its details within the time which I have been able to give to it. When I set out to prepare this address I knew that I could do no more than touch on the principles of "Monotype" machine organization or mention some of the details seen through my own personal experience in a large plant.

CORRECT WORKING TEMPERATURES FOR "MONOTYPE" METAL AND MOULDS

It is impossible to lay down any exact rule that can be used under all circumstances. The temperature of metal and moulds will naturally vary according to the size of type which is being cast and the speed at which the machine is run. This applies particularly to a "Monotype" mould because the larger the size of the type being cast or the greater the speed at which the machine is running, the greater the quantity of metal that will pass through it in a given time. Consequently an increased flow of water will be required to keep the mould at the correct temperature.

The mould should be kept at a temperature which is consistent with good working, that is to say, it should not be so hot that it causes the mould blade to hold up or the cross block to bind. At the same time the types being cast must be adequately cooled during the time they are in the mould in order that they will not disintegrate or swell during their passage from the mould to the type channel.

The temperature of the mould, which is governed of course by the temperature of the metal, is decided by several factors. There are normally two extremes of temperature of the metal in the pot: the lower limit at which it is impossible for the machine to cast type and the higher limit at which the metal is likely to squirt and the type likely to blister and burst. Between these two limits lies the correct temperature, which is best judged by examining the appearance and quality of the type being produced. If the type has a frosted

appearance and the corners are not sharply defined, the temperature of the metal is too low. If on the other hand the type is very bright but shows signs of blistering, the temperature of the metal is too high. The ideal type should be solid, not blown, and with the corners well defined.

When these conditions are fulfilled, particular attention must be paid to the face of the type, and it is most important that this is sharp and well cast with every part of its outline showing clearly and distinctly. The whole purpose of producing type is to print it efficiently on paper, and if the face of the type is not perfect in every way nothing that the machine-minder can do in the way of make-ready can remedy this imperfection.

Where the face of the type is defective the fault is usually due to one of the following causes: the temperature of the metal or mould is too low; the metal is dirty; the nozzle and pump body is not perfectly clear; there is oil on the face of the matrices; the piston is dirty.

The piston should be examined first, then the temperature of the metal raised and regulated to that of the mould.* The face of the type may often be improved by strengthening the piston take-up spring. In this case care should be taken to see that too much pressure is not applied, as this will result in an undue load on the machine at this particular point of its revolution; this will affect its balance and may prevent the machine working smoothly. It may also cause excessive wear on the pump mechanism. It should be regarded as an ideal for the pump spring to be worked with the minimum compression consistent with the production of good type. If the type metal is satisfactory the main factor in obtaining good results will be its temperature, which depends wholly on the intelligence and care which is given to it by the caster attendant.

As, normally, the production of good type depends on the correct temperature of the metal and mould, it is essential that great attention should be paid to this detail. Caster attendants would do well to make notes of their experiences in this regard so that they may benefit by them when similar conditions arise.

Some conditions may demand a change in temperature, but as a general rule it will be found that the most satisfactory results are obtained with a temperature ranging from 660°F. for 12-point to 700°F. for 6-point. The latter should be the maximum temperature for composition type and should not be exceeded.

A thermometer is a delicate instrument and should be handled carefully. It should not be thrown down hastily or given a sudden jerk, or the mercury may become divided and so render accurate reading impossible. Should the mercury in the column become divided, however, it may be swung to and fro to assist union. The thermometer should then be allowed to stand for about four hours or until the mercury has joined together.

Always remove the thermometer and hang it in a safe place when leaving the machine for any considerable time. This will avoid overheated metal driving the mercury to the extreme top, which should never be permitted to occur. A cold thermometer should never be plunged deeply into molten metal but heated gently by first dipping the point.

* Where a temperature regulator is applied the required temperature is automatically maintained.

ALEXANDER MACKIE
(1825-1894)

THE INVENTOR OF THE ROTARY STEAM COMPOSING MACHINE

BY ELLIC HOWE

It is now over half a century since Tolbert Lanston began that long series of experiments which eventually gave us modern "Monotype" composing machines. Twenty years or so before this time Alexander Mackie invented a mechanism for setting up type which is of particular interest to users of "Monotype" machines, as it was controlled by a perforated ribbon.

An anonymous biographer has written of Alexander Mackie that "while apprenticed to a Perth trader, Dr. Mackie assiduously prosecuted those studies which would qualify him to enter the Glasgow University, with the object of becoming a minister of the Church of Scotland, but a visit to England induced him to change his mind, and to endeavour, from the press rather than the pulpit, to attain the fulfilment of his ambition—a useful life." It was in 1852 at Warrington, and with the support of the principal townsmen of Warrington that he founded the *Warrington Guardian*. He was then in his twenty-seventh year. He eventually became the owner of some fifteen newspapers in that part of England. His work as a journalist, and his religious, social and philanthropic activities, do not concern us here although they eventually earned him a high reputation and the Mayoralty of the town of his adoption.

As a newspaper proprietor he was also a printer. Even in those days printers were not slow to take advantage of any method which would speed-up production. By 1861 the paper tax was remitted and small steam-driven cylinder presses were being installed in country offices for jobbing work. The rate of impression had been increased by mechanical means, but type composition was no quicker than before. Mackie, who was something of a mechanic, turned his attention to the invention of a type-setting machine, which was to intervene between the compositor and his pair of cases. He hoped to benefit himself and other progressive printers in the country.

There had already been filed some dozen or more patents relative to composing machines, but no machine had yet been entirely satisfactory. Young and Delcambre's machine had been used to set the *Family Herald* in 1842, and the inventions of Alden and Mitchel had been operated in America. The field could not be said to be competitive, and mechanical engineering had not become so precise a science as it is to-day. An amateur like Mackie could experiment with a chance of success.

His first patent in connection with printing was taken out in 1864. It was for obtaining impressions or proofs by placing a piece of paper, treated with oil and black or coloured carbonaceous matter, between the type and paper, thus dispensing with inking the types. This paper had the same qualities as our present-day typewriter ribbon. In the following year he patented a distributing machine which, he claimed, would deal with 80,000 types an hour. He had a number of other schemes for typesetting and distributing. There was, for instance, a new type case for facilitating composition, combined with a keyboard mechanism for extracting types, which were to fall on a moveable band and thence to the stick.

But it was not until 1867 that he conceived the idea of controlling a typesetting machine by a perforated paper ribbon. The idea was not altogether new. Jacquard had used it for controlling a loom years before. Mackenzie in 1848 and Martin in 1849 had both received patents which specified its use for composing machinery. But the invention did not reach a practical form for type composition until it was

utilised by Mackie. It is doubtful whether either Mackenzie or Martin even constructed a machine embodying the principle.

Mackie's machine consisted of two parts. One was a small instrument consisting of fourteen keys, by means of which narrow strips of paper were perforated. The machine itself consisted of three horizontal rings, about three feet in diameter and two inches broad, the lowest one and the top one being at rest. On the top ring were twenty pockets, each containing compartments for seven different kinds of type, and being sufficiently open at the bottom to allow the proper apparatus to extract the lowest type from any one (or from all the seven divisions) as required. The centre (or travelling ring) had twenty pickpockets, each carrying seven of what were called the legs-of-man and seven fingers. At the place where the machinery came into operation there was a drum, about two inches in diameter, with fourteen perforations across its upper surface, and the paper, previously perforated, was made to travel over this drum by a positive motion of one-tenth of an inch every movement. On the top of the drum and paper there were fourteen levers with pegs, which were always ready to enter the perforations in the drum, but were only able to enter where there were corresponding perforations in the paper. Half of the perforations regulated the legs-of-man and the other half the fingers. Two perforations were always made in the former, and from one to seven in the latter, so that a pickpocket was capable of taking out type at the same moment from all of the seven divisions of any pocket. When the type was extracted it remained on the travelling ring until it reached the delivery channel, when a pusher placed it on a travelling belt, a few inches long, from which it was pushed down a syphon spout, one letter on another, ready for justification in lines.

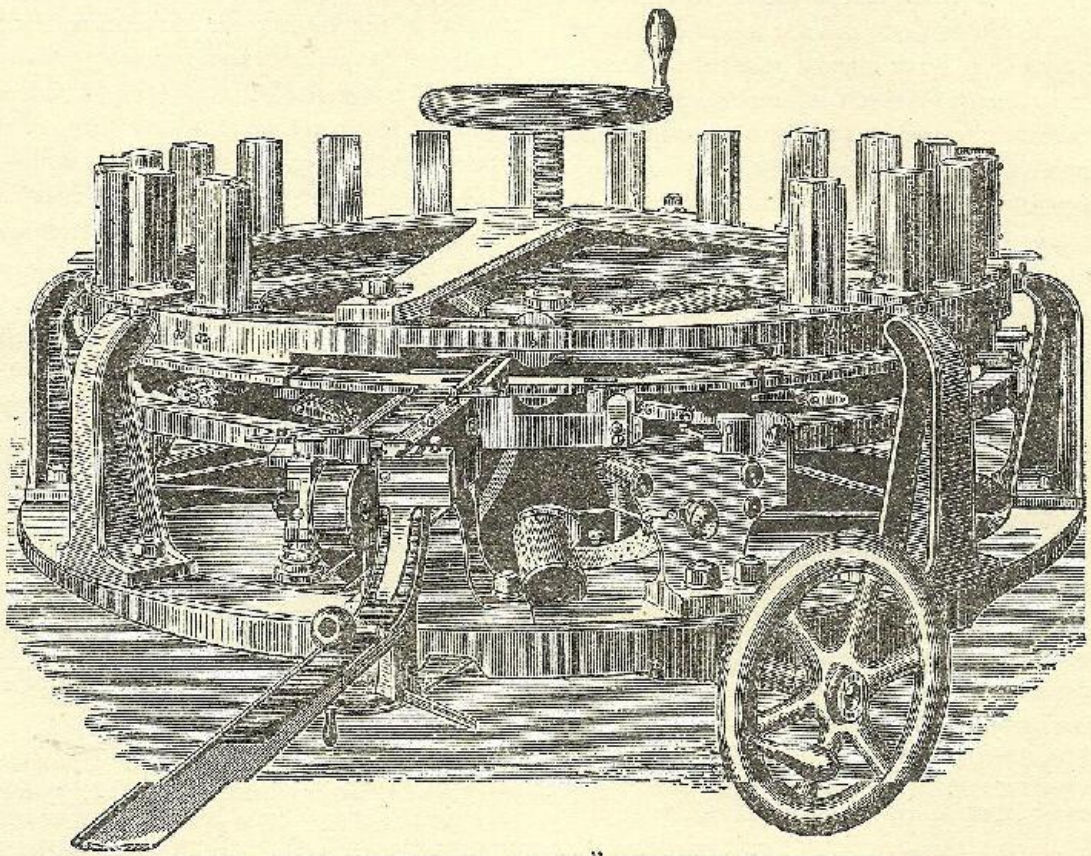
Under the heading "Mackie's Composing Machine" the *Printers' Register* for February 1871, contained the following paragraphs: "This Composer has now been at work at Messrs. Clay, Son, and Taylor's, London, for two months; and although several eminent machinists have been favoured with a sight, we understand that 'the trade' are not to be invited until the success of the machine is beyond doubt. Viewed as a mechanical success we can speak most positively. It gives the most perfect satisfaction, not only to the eminent firm who have purchased it, but to such machinists as Mr. Napier, who is so able to speak of it from mechanical points. It is very strong; very simple in its movements; and, being a series of duplicates, can be understood at a glance, and any mishap easily made good. Our readers will remember, from the account in the *Register* for November, 1869, that the Composer has no keys, no tapes, nor gravitation movements. It is circular in its motion, which is the perfection of any mechanical movement; and if fed with type and perforated paper regularly, will set equal to a *Times* column of Minion every hour, and allow twenty-five per cent. of the time for stoppages. It is but just to Mr. Mackie to state that he by no means says that, while his Composer sets ten columns per day, it will do the work of ten men, which ten columns represent. But he does assert that distribution—*ready* for the machine—costs only ½d. per 1,000, the perforating ¾d. per 1,000 (which may be used for any other size of type, a second or even tenth time), and that the machine needs but three lads to work it, and as many men as can 'justify' a column an hour, which has been spaced by the machine. These business matters will soon test themselves. In the meantime we conclude by using the words of an eminent engineer, 'It is the only purely mechanical composer that we have seen.' "

In the same year the machine was shown to the trade at Harrilds', where it attracted a great deal of attention. There were a certain number of references to it in the trade press, and Mackie made extravagant claims for it in his advertisements. In the January issue of the *Printers' Register* Robert Hattersley, the inventor and promoter of a rival machine, claimed that he could show "that *one* operator at his Composer can produce *three times* the quantity of finished matter that can be composed per operator from any Automatic Composer". This barb was aimed at Mackie, who asserted that his apparatus would "set from 6,000 to 40,000 Types an hour, according to size of Machine". Hattersley, however, wrangled with all his serious rivals; a few years later he assailed Mr. Kastenbein, the inventor of the machine which was adopted by *The Times*.

In spite of regular advertising, and improvements made in the mechanism from time to time, the machine never achieved any considerable success. At one time part of the *Manchester Guardian* was composed on Mackie's machine, but there are no references to the sale of it throughout the country, as was the case with Hattersley's machine. While the writer can trace no references to the Steam Composing Machine after the year 1884, the Hattersley machine is mentioned in the late nineties, by which time the first "Monotype" machine was beginning to make history.

There is, however, at least one monument to the ingenuity and persistence of Mackie. We do not refer to the statue of Queen Victoria presented by him to the people of Warrington in 1887, but to a book entitled "Italy and France: An Editor's Holiday", written by himself and published privately in 1874. This work was "entirely set by my Steam Type Composing Machine". Mackie and five friends had enjoyed a month's holiday abroad and the book is a record of their adventures. While the typography is undistinguished, it has the merit of being eminently readable.

Hattersley seems to have had the last laugh, as even a quarter of a century ago there were seventeen of the machines bearing his name at work on the *South Wales Daily News*. But to-day there are "Monotype" machines all over the country, with their "previously prepared perforated paper ribbons" (if we may be allowed to quote one of Mackie's patent specification abridgements), turning out work of a quality that would have delighted Mackie, and inspired the polemical Hattersley to claim that he could do *three times* as much with *one* operator!



MACKIE'S "STEAM TYPE COMPOSING MACHINE" CONTROLLED BY INDEPENDENTLY PERFORATED RIBBON, 1875. NOTE RIBBON IN LOWER FOREGROUND

QUESTIONS OF INTEREST

ANSWERED BY R. C. ELLIOTT

THE USE OF THE TERM PICA

A CORRESPONDENT writes concerning the answer to a question in THE MONOTYPE RECORDER (Vol. 35, No. 3): "I was surprised at your answer that the term pica should be generally adopted as it infers a typographical unit rather than a measurement, and that an instruction to compose copy to a measure of 24 picas is less cumbersome than saying 'a measure of 24 12-pts.' I cannot agree with your reply, and the older craftsmen are handing on to the young ones the old-fashioned terms, *i.e.* pica, nonpareil, and it is high time these terms were forgotten. If you use the term pica, would you be so old-fashioned as to say '4-to-pica leads', etc.? Why not say 'put an extra long primer or brevier in the forme'? Would you ask for matter to be set to 24-ems of long primer? If not, why 24 picas?"

Our correspondent has evidently misunderstood us; it may be our answer to the original question was insufficiently clear. The point is that some basic term should be retained as a standard, as it is obviously better to instruct a compositor or keyboard operator to set copy to a measure of 24 picas rather than to 288 points or 24 12-points, just as on the Continent one would say "24 ciceros" instead of "24 cms of 12-point Didot". In other words, we contend that the word pica may reasonably and usefully be employed as a term of measurement in the same way as the inch, gallon or ton in their particular references. It is not advocated that 10-point should be called "long primer" or 8-point "brevier", but that the term pica should still be employed to denote the number of 12-point ems in any line length. Where measures have to be set to ems of the type's own body, instructions should of course be precise, such as "12 ems of own body".

Q.—How is type cast on a "Monotype" machine produced equal to that of foundry type?

A.—The production of solid display type on "Monotype" casting machines, which is equal in every respect to the best type sold by the typefounders, is made possible by employing a high pressure on the pump piston. In addition to obtaining the advantages of solid type, the use of strong spring pressure enables casting to be made at a much lower temperature, thereby increasing the life of the matrices which are often damaged by overheated metal. The standard pump maximum is altered as required to convert it to the high pressure spring attachment.

Q.—Will you please tell me how to convert temperatures from Fahrenheit to Centigrade and vice versa?

A.—To convert Fahrenheit to Centigrade deduct 32, multiply by 5 and divide by 9.

To convert Centigrade to Fahrenheit, multiply by 9, divide by 5 and add 32, that is to say, reverse the previous process: *e.g.* 60° Centigrade=140° Fahrenheit.

Q.—In a paper set by the City & Guilds to typography students, it was suggested that there is a difference between the weight of body type set from founders' type and that cast on a "Monotype" standard Composition Caster?

A.—This is not necessarily the case, as tests have proved that often the weight of a given amount of composition cast on a "Monotype" machine has been greater than similar composition from foundry type.

The formula that 4 sq. ins. weigh a pound is a very rough rule-of-thumb method of calculating, and would depend for its accuracy on many factors, such as the length of the words used (if there were a lot of short words there would be a lot of spaces and the type would weigh less), the amount of quadded matter or letters with or without ascenders and descenders. Nevertheless, as a rough-and-ready method of estimating the weight of type it may be assumed to be more or less practical.

Q.—Often a customer asks us if we have a certain type face available on our "Monotype" machines. When the particular type face is not available we naturally begin to discover how far our existing equipment would be of use to us if we decided to buy the matrices of the suggested face. We notice that only the set-width and line are given on the pages in your Specimen Book, but we are constantly having to turn up the requisite keybar frames and stopbar cases. Would it not be possible to print this information on the appropriate specimen sheet so that it would be more convenient in use?

A.—It would be a simple matter to print on each specimen sheet the reference numbers of the standardised arrangements of 5, 6, or 7-alphabet keybars and stopbars for the various type series, but so many printers have their own special arrangements of layouts and there is such a wide range of possible combinations of faces, that the exceptions overshadow the rule, and the value of such references to the average printer would be of little account.

Q.—In answer to a question, a reader of the Newspaper World *states that the temperature of the metal on a composition caster should range between 660°F. for 12-point, and about 700°F. for 6-point, but that the actual temperature "will depend on circumstances" and that "experience is the best guide". Cannot more definite information be supplied to caster attendants who are unaware of what circumstances may arise to revise these figures, and who have as yet insufficient experience to guide them?*

A.—The writer of the paragraph probably had in view the differences in the composition of the type metal alloy, the quantity of water passing through the mould, the nature of the composition (whether open or solid), and other local considerations. These render it impossible to lay down definite temperatures for casting. The experienced caster man quickly adapts himself to local conditions, just as an expert car driver regulates his "mixture" according to existing climatic conditions.

THE MONOTYPE CORPORATION LIMITED

43 Fetter Lane, London, E.C.4

Telephone: Central 9224 (5 lines)

Representatives of The Monotype Corporation stand ready at any time to advise on methods of increasing output, special operations, etc., of "Monotype" machines and their supplies, and to furnish specimens, trial settings and advice on new type faces

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New Zealand	210 Madras Street, Christchurch. (Representative) C. J. Morrison

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Sweden	Maskinfirman Monotype, Harald Pettersson, Jakobsbergsgatan 28 II, Stockholm
Spain & Portugal	P. E. Goodall, Calle Lagasca 70, Madrid

We beg to remind our friends and the Trade generally that the word MONOTYPE *is our Registered Trade Mark, and indicates (in this country) that the goods to which it is applied are of our manufacture or merchandise. Customers are requested to see that all keyboards, casters, accessories, paper, and other goods of the kind supplied by us, bear the Registered Trade Mark in guarantee that these are genuine.*

O thou beneficent ART & MYSTERY whose mission it is to carry Enlightenment to all people from age to age: Make us, thy craftsmen, worthy of thee and of all the craftsmen who in times past have glorified thee. Let thy light shine upon our lives and upon our vocations. May no word of ours, or any of our handiwork, bring dishonour upon thee; but rather may we uphold thy dignity at all times and in all places, and in brotherly love and helpfulness advance thy fame, to the end that all men may be persuaded to acknowledge thee as Mightiest among the Arts and Crafts

So let it be!

HENRY LEWIS BULLEN

SPECIMEN OF A NEW "MONOTYPE" SERIES: NUMBER 457

WITH ALBERTUS ROMAN TITLING 48 POINT